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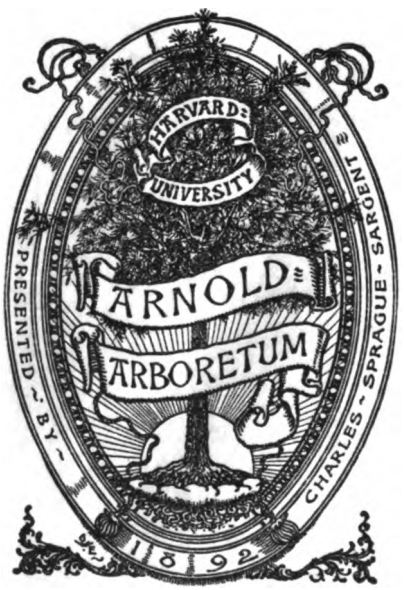

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THE OHIO STATE UNIVERSITY BULLETIN
VOLUME XX NUMBER 35

OHIO BIOLOGICAL SURVEY

BULLETIN 8
VOLUME II, No. 4

THE TINGITOIDEA OF OHIO

HERBERT OSBORN AND CARL J. DRAKE

June, 1916

PUBLISHED BY THE UNIVERSITY AT COLUMBUS, OHIO
Entered as second-class matter November 17, 1905, at the postoffice at Columbus, Ohio, under Act of Congress, July 16, 1894.

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VOLUME II, NO. 4 BULLETIN 8

Ohio Biological Survey

THE TINGITOIDEA OF OHIO

HERBERT OSBORN
and
CARL J. DRAKE

Published by
THE OHIO STATE UNIVERSITY
COLUMBUS,
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CONTENTS

PAGE

Superfamily Tingitoidea 217

Family Piesmidae 218

Genus Piesma 218

Family Tingitidae 219

Genus Acalypta 220

Genus Fenestrella 222

Genus Corythucha 224

Genus Gargaphia 233

Genus Galeatus 236

Genus Leptostyla 237

Genus Leptobyrsa 240

Genus Leptophya 241

Genus Physatochila 242

Genus Melanorhopala 243

Genus Alveotingis 245

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THE TINGITOIDEA OR "LACE-BUGS" OF OHIO.

Herbert Osborn and Carl J. Drake.

The insects belonging to the superfamily *Tingitoidea* are commonly known as "lace-bugs." They are readily differentiated from all other Hemipterous-Heteropterous insects by the net-, gauze-, or lace-like appearance of their dorsal surface. This peculiar appearance is due to the more or less closely reticulate relief of the membranous pronotal margins and the elytra or hemielytra. The lace-bugs are all rather small insects and plant feeders. They are usually found on the underside of the leaves of trees and shrubs, also a few herbaceous plants. When present in sufficient numbers they may do a considerable amount of damage to cultivated shrubs and plants.

We have included several species not yet collected within the borders of the state, but which probably belong to our fauna.

In the descriptions of the genera and species we have followed Dr. Champion (Biologia Centrali-Americana, Rhynch., Vol. II, p. 1), and the following terms are used for the different portions of the elytra: (1) costal area (the outer membrane of Stål), (2) subcostal area (the costal area of Stål), (3) discoidal area, (4) sutural area.

Acknowledgment.—The authors desire to express their sincere thanks to those who have very kindly assisted in the preparation of this paper as follows: Dr. L. O. Howard, Bureau of Entomology, Washington, D. C., for the loan of specimens from the National Museum and for plates from the United States Department of Agriculture; Mr. Otto Heidemann, Washington, D. C., for the use of specimens from his private collection; Dr. E. H. Ewing, Ames, Iowa, for the use of material from the collection of Iowa State College; Mr. H. M. Parshley, Harvard University, for specimens from his private collection; The Entomological Society of Washington for the loan of plates made from drawings by Mr. Heidemann; Dr. A. W. Morrill, State Entomologist, Phoenix, Arizona, for the privilege of using his plate showing life history; Mr. James Hambleton who has made the original drawings; Mr. Frank H. Smith for the photographs.

KEY TO THE FAMILIES OF THE TINGITOIDEA.

Pronotum produced posteriorly, forming a triangular process; ocelli wanting; elytra of a uniform texture throughout, densely areolated, membranous between the areolae.....Family *Tingitidae*

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Pronotum not produced posteriorly; ocelli present; hemielytra with a distinct membrane, the rest reticulately punctate.....Family *Piesmidae*

Family PIESMIDAE.

Head short and broad; juga free, longer than the tylus, produced before the apex of the head. Rostrum consisting of four segments. Eyes small, prominent; ocelli present, inserted close to the margins of the prothorax. Legs short; tarsi consisting of two segments. Hemielytra with a distinct non-reticulate membrane.

This family contains only one Nearctic genus.

Genus **Piesma** Lepelletier et Serville.

Piesma Lepelletier et Serville, Encycl. Méthod. X, p. 653, 1825.
Zosmenus Laporte, Essai class. syst. des Hémipt, p. 49, 1832.
Aspidotoma Curtis, Entomol. Magaz., I, p. 196, 1833.
Zosmerus Douglas et Scott, Brit. Hem.-Het., p. 237, 1865.
Piesma Stål, Enum. Hémipt., III, p. 115, 1873.

Head short, broad, deflected. Antennae short; first segment strongly swollen, with a short petiole; second segment shorter than the first, less swollen; third segment longer than the first and second conjoined; fourth segment stout, longer than the first, fusiform. Ocelli small, inserted close to the posterior margin of the head. Legs short; tarsi composed of two segments; claws short, curved. Scutellum small, triangular. Hemielytra as long as the abdomen, with a distinct non-reticulate membrane at the apex, the rest reticulately punctate.

The genus contains only one described American species.

Piesma cinerea Say (Plate X, fig. a).

Tingis cinerea Say, Descr. Heteropt. Hémipt., p. 26, 1832; Compl. Writ., Vol. I, p. 349, 1859.
Piesma cinerea Stål,, Enum. Hémipt., Band. III, p. 116, 1873.
Piesma cinerea Comstock, Intro. Entom., p. 204, 1888.
Piesma cinerea Summers, Bull. Agr. Exp. Stat. Tenn., Vol. IV, No. 3, p. 90, 1891.

This species is commonly known as the "ash-gray" leaf bug. According to Prof. Summers it often does a considerable amount of damage to the leaves and flowers of grapes.

Head with a short, stout spine between the antennae and eyes. Antennae short; first segment strongly swollen, abruptly smaller at the base, longer than the second; second segment short, less swollen; fourth segment swollen towards the apex, beset with a few short hairs. Rostrum reaching slightly beyond the first pair of coxae. Pronotum with four elevated lines, obsolete behind. Length, 2.9 mm; width, about 1.2 mm.

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Color: Beneath grayish, more or less varied with brown; venter brownish, with spots or lines of grayish. Prothorax and elytra grayish, more or less spotted with dark-brown or black. The color varies in different specimens. In some forms the spots are almost entirely wanting.

Common thruout the state. It may be taken in the winter hibernating beneath the bark of sycamore and horse chestnut. Columbus, Berea, Cedar Point, Jefferson, Buckeye Lake, Chillicothe, and Perry Co.

Family TINGITIDAE.

Head sometimes with dorsal porrect spines; juga not prominent, not longer than tylus. Antennae consisting of four segments; third segment longest. Rostral sulcus rather deep, sides raised; rostrum consisting of four segments. Ocelli wanting. Tarsi consisting of two segments. Pronotum, in front, with a hood or only tumid; lateral margins foliaceous, reticulately projecting or closely lapped over on the pronotum; disc with one or three carinae; posterior triangular process usually long. Elytra of a uniform thickness, more or less closely reticulated thruout; membranous between the reticulations.

This family contains several genera that present wide differences.

KEY TO THE GENERA OF OHIO TINGITIDAE.

1. Membranous pronotal margins not expanded; or reflected vertically; or reflected more or less against the dorsal surface of the pronotum..... 8
   Membranous pronotal margins more or less reflected, but at an obtuse angle 2
2. Pronotum with a pronotal and discal hood, the latter divided behind; areolae very large.....Genus *Galeatus* Curtis
   Pronotum with only a pronotal hood; areolae very much smaller..... 3
3. Rostral sulcus interrupted between the meso- and metasternum by a prominent, sinuose, transverse carina.....Genus *Gargaphia* Stål
   Rostral sulcus uninterrupted by a transverse carina..... 4
4. Outer edge of membranous pronotal margins and elytra, except distal third, armed with short, acute spines; elytra with a tumid elevation near the antero-inner margin.....Genus *Corythucha* Stål
   Outer edge of membranous pronotal margins and elytra unarmed (in the genus *Leptobyrsa* closely beset with fine hairs)..... 5
5. Pronotum with a single median carina.....Genus *Fenestrella* n. gen.
   Pronotum tricarinate 6
6. Discoidal area reaching beyond the middle of the elytra.....
   Genus *Acalypta* Westwood
   Discoidal area not reaching the middle of the elytra..... 7
7. Elytra very broad, extending about one-half beyond the apex of the abdomen, the outer margin broadly rounded and beset with numerous, fine hairs .....Genus *Leptobyrsa* Stål

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Slender insects; elytra narrow, shorter, the outer margin more or less constricted about the middle, hairs on outer margin wanting..... Genus *Leptostyla* Stål

8. Membranous pronotal margins not expanded.....Genus *Leptophya* Stål
Membranous pronotal margins reflected vertically; or reflected more or less against the dorsal surface of the pronotum 9

9. Reflected pronotal margins very broad, broadly rounded, touching or nearly touching the outer carinae.....Genus *Physatochila* Fieber
Reflected pronotal margins very narrow, subquadrate..... 10

10. Subcostal, discoidal, and sutural areas undifferentiated; body very thick; antenniferous tubercles very large.....Genus *Alveotingis* n. gen.
Subcostal, discoidal, and sutural areas distinct; antenniferous tubercles much smaller 11

11. Antennae contiguous at the base; elytra broadly rounded at the apex..... Genus *Teleonemia* Costa.
Antennae not contiguous at the base; elytra greatly narrowed or obliquely rounded at the apex.....Genus *Melanorhopala* Stal.

Genus **Acalypta** Westwood.

Acalypta Westwood, Mod. Class. Ins., Vol. II, Syn. Gen., p. 121, 1840.
Acalypta Stål, Enum. Hémipt., Band. II, p. 118, 1873.

Antennae moderately long, rather stout; first segment swollen, longer than the second; second segment less swollen, short; third segment very long, slender; fourth segment fusiform. Pronotum tricarinate; rather closely reticulated; hood small, covering the base of the head; lateral margins expanded, subquadrate. Costal area narrow, coarsely reticulated, with one complete or with one complete and a partial series of areolae; subcostal area closely reticulated, much narrowed behind; discoidal area rather wide, extending beyond the middle of the elytra; sutural area (brachypterous form) with the inner margin straight, narrow. In the macropterous form the sutural area is broad with the inner margin rounded.

KEY TO THE SPECIES OF ACALYPTA.

Costal area of the elytra with one complete and the greater part of a second series of areolae .....*A. thomsonii* Stål
Costal area with a single series of areolae, or uniseriate in greater part (Figs. 1 and 2).....*A. lillianis* Bueno

Acalypta thomsonii Stål.

Acalypta thomsonii Stål, Enum. Hémipt., Band. III, p. 122, 1873.
Acalypta thomsonii Bueno, Bull. Brook. Ent. Soc., Vol. XI, p. 39.

Head armed with two rather stout, blunt porrect spines—one on each side of the median line just above the antennae. Rostrum reaching almost to the end of the first abdominal segment. Antennae rather stout, beset with a few short hairs; first segment considerably swollen, about twice the length of the second; second

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segment short, less swollen; third segment nearly twice the length of the fourth, slenderest; fourth segment fusiform. Pronotal hood narrow, extending between the eyes. Pronotum with the discal carina diverging posteriorly. Elytra with the outer margin rounded; costal area coarsely reticulated, with one complete and nearly a second series of areolae; discoidal area extending beyond the middle of the elytra. Length, 2.5 to 3 mm.; width, 1.5 to 1.75 mm.

Color: General color griseus. Body beneath and legs ferrugineous. Antennae ferrugineous; the basal and apical segments blackish. Thorax and elytra griseus.

Habitat: South Carolina (Stål) and Virginia (Barber).

Acalypta lillianis Bueno.

Acalypta lillianis Bueno, Bull. Brook. Ent. Soc., Vol. XI, p. 39, 1916.

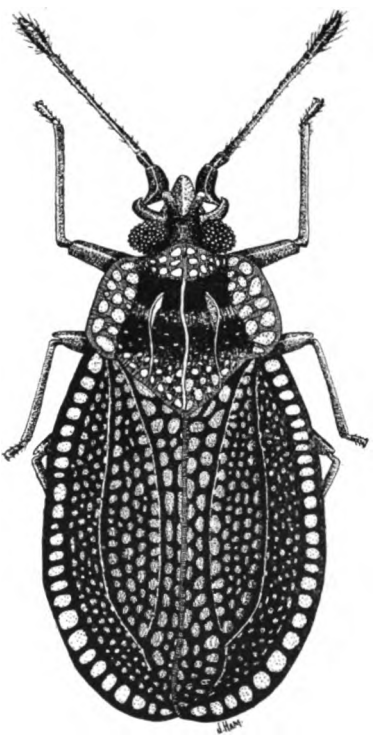

Fig. 1. Acalypta lillianis Bueno, brachypterous form (length, 2.3 mm.).

"Black, posterior part of pronotum and hemelytra dark gray; third joint of antennae of equal thickness throughout, four times as long as the fourth, longest, second joint shortest, first stoutest and shorter than fourth, which is not quite so stout as second; pronotum tricarinate, keels nearly parallel, or at most slightly diverging posteriorly, the middle keel highest; hood small, not projecting over head, slightly angulated in front, somewhat higher than the median keel; sides

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foliaceous, more or less biseriately reticulate, anteriorly rounded; costal membrane uniseriate in greater part. Abdominal segments broadly banded with rufous."

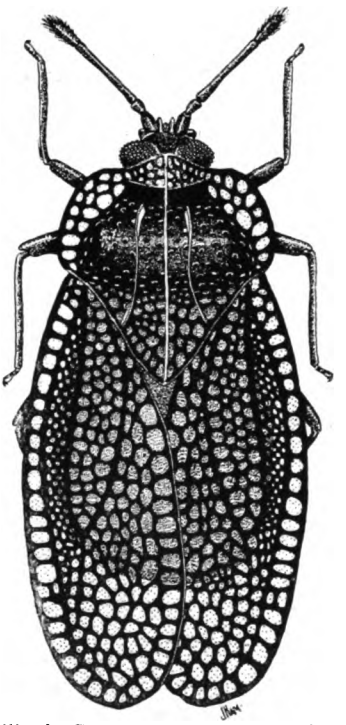

Fig. 2. Acalypta lillianis Bueno, macropterous form (length, 3 mm.).

"The macropterous form has the membrane complete, reticulately veined; in the brachypterous, it is much reduced and is biseriately reticulate. The pronotum in the former is quite high, but in the latter much reduced in area and nearly flat. The hemelytra are one-third longer than the body in the macropterous form, and in the brachypterous exceeds it but very little. The brachypterous form is nearly oval, while the macropterous is elongate."

Length (macropterous), 3 mm.; width, 1.6 mm.

Length (brachypterous), 2.3 mm.; width, 1.2 mm.

Habitat: Michigan, New York, Maine, New Hampshire, and Canada (Ottawa).

Genus **Fenestrella** gen. nov.

Head with at least three spines, almost entirely covered with the hood. Antenniferous tubercles small. Antennae rather short; first segment swollen almost twice the length of the second; second segment short, less swollen; third segment long cylindrical, slender; fourth segment inflated, fusiform. Eyes strongly granulate; a short blunt spine or process between the eyes and antennae.

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Rostral groove uninterrupted. Pronotum with a single median carina; hood broad, reaching to the vertex of the head; lateral membranous margins broad, coarsely reticulated; posterior process very obtusely angled. Legs short and slender. Elytra broad oval; outer margin rounded; costal area widely reticulated, with one complete and a partial series of areolae at base and apex; subcostal area very broad and long, reaching the apex of the elytra; discoidal area broad, reaching far beyond the middle of the elytra; sutural area very narrow at the middle, widened at the base and apex, inner margin straight, except at the apex slightly overlapping.

The genus contains a single species, *Fenestrella ovata* n. sp., the type of the genus. It is close to *Acalypta*, but can be readily separated by the single median carina, the trispinous head, and the larger hood.

Fenestrella ovata spec. nov. (Fig. 2).

Head with three short, blunt spines—a short median spine just above the antennae and the two lateral converging spines inserted just above the median

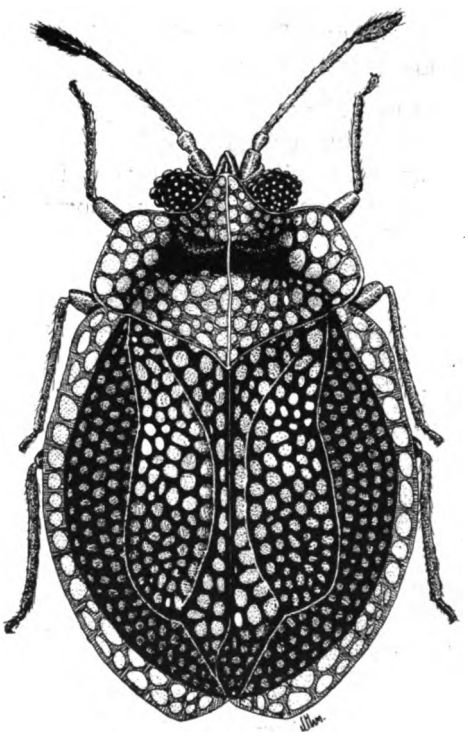

Fig. 3. Fenestrella ovata n. sp.

spine. Antennae considerably less than one-half the length of the body; beset with a few short hairs; first segment nearly twice the length of the second; third

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segment slightly more than twice the length of the other three conjoined; fourth segment hairy, very slightly longer than the first and second segments. Rostrum reaching the end of the rostral groove. Eyes very coarsely granulate. Pronotum reticulated, except near the base of the hood; median carina raised, with two or three areolae at the middle. Membranous pronotal margins very wide and broad, subquadrate, widely reticulated; hood rather coarsely reticulated. Legs short, beset with a few short hairs. Costal area very coarsely reticulated, with one complete and a partial series of areolae; subcostal area with five series of areolae; discoidal area broad, with five or six rows of areolae; sutural area with one complete and one or two partial rows of areolae at the base and apex. Length, 2 mm.; width, 1.35 mm.

Color: Body dark gray-brownish. Legs and antennae brownish. more or less tinged with yellow. Eyes brownish. Pronotum yellowish, tinged with brown. Elytra brown, slightly tinged with yellow. Areolae hyaline or whitish.

Described from a female specimen, taken at Cincinnati, Ohio, by Mr. Chas. Dury.

Genus **Corythucha** Stål.

Corythucha Stål, Enum. Hem., Band. III, p. 119, 1873.

Head entirely concealed by the hood, the apex of hood reaching a little in front of the head. Antennae slender, beset with long, bristly hairs; first segment more or less swollen, from two to three times the length of the second; second segment less swollen, short; third segment very long, cylindrical; fourth segment moderately swollen towards the apex. Membranous pronotal margins broad, armed on the outer margins with short spines. Elytra narrowed at the base with outer margin strongly reflexed, with a tumid elevation near the antero-inner margin; costal margin including anterior reflected margin armed with spines, except about the distal third. The nervures of hood, membranous pronotal margins, and the elytra irregularly armed with a few erect spines.

KEY TO THE OHIO SPECIES OF CORYTHUCHA.

1. First segment of the antennae twice or slightly more than twice the length of the second..... 2
   First segment of the antennae three or almost three times the length of of the second..... 7
2. Hood not very abruptly constricted about the middle; color entirely white, except elytra usually with a brown spot on the tumid elevation.. *C. ciliata* Say
   Hood abruptly constricted about the middle; hood and membranous pronotal margins pallid or hyaline, usually with a few brown markings; elytra pallid or hyaline, with one or two transverse brown or fuscous bands 3

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3. Color pallid; elytra with a more or less indistinct band near the base and the apical band very indistinct or entirely wanting.....*C. pallida* n. sp.
Color hyaline or brownish; elytra with distinct brown or fuscous bands near the base and apex, the latter band sometimes wanting..... 4
4. Globose portion of the hood narrow; body black, except the margins of the prosternum, the humeral area, and the last abdominal segment brownish or fulvous..... 5
Globose portion of the hood quite broad; body entirely black..... 6
5. Size small (about 3.2 mm.); hood sinuate on dorsal surface at the constriction .....*C. pergandei* Heid.
Size larger (4 mm.); hood not sinuate on the dorsal surface at the constriction .....*C. pruni* n. sp.
6. Hood moderately deflected; fourth segment of the antennae thick and brown .....*C. juglandis* Fitch
Hood more strongly deflected; fourth segment of the antennae less swollen and fuscous.....*C. celtidis* n. sp.
7. Globose portion of the hood twice or more than twice as broad as triangular portion at constriction..... 8
Globose portion of hood less than twice as broad as triangular portion at constriction; elytra marmorate..... .....*C. marmorata* Uhler
8. Size large (4 mm. or longer); globose portion of the hood very large; anterior portion directed almost vertically downward..... 11
Size smaller (less than 4 mm.); globose portion of hood smaller; anterior portion of the hood directed obliquely forward..... 9
9. Elytra narrowed posteriorly, with two black-fuscous bands..*C. contracta* n. sp.
Elytra not narrowed posteriorly, with one or two brown hands..... 10
10. Hood moderately raised; nervures of hood and membranous pronotal margins almost entirely yellowish; elytra with one or two brown bands .....*C. arcuata* Say
Hood considerably raised; nervures of hood and membranous pronotal margins mostly embrowned; elytra with two transverse brown bands *C. crataegi* n. sp.
11. Globose portion of the hood very large; membranous pronotal margins and elytra without a continuous brown margin.....*C. aesculi* n. sp.
Globose portion of the hood extremely large; membranous pronotal margins and elytra broadly margined with dark-fuscous.....*C. bulbosa* n. sp.

Corythucha ciliata Say (Plate VIII, fig. h).

Tingis ciliata Say, Hemip. New Harm., p. 27, 1832; Compl. Writ., Vol. I, p. 348, 1859.

Corythucha ciliata Morrill, Psyche, Vol. X, p. 133, 1903.

This is the common buttonwood or sycamore lace-bug. It is readily separated from the other Ohio forms in the genus by its whitish color.

Antennae beset with numerous bristly hairs of various lengths; first segment twice as long as the second; fourth segment slightly swollen towards the apex. Rostral sulcus very broad; rostrum reaching the meso-metasternal suture. Mem-

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branous pronotal margins broad, bullate about the middle, slightly reflexed at the anterior and posterior margins. Hood moderately raised, not very abruptly constricted about the middle; posterior portion subglobose. Apex of triangular process faintly reticulated; the sides feebly raised anteriorly, with a few distinct areolae. Costal area of the elytra unevenly reticulated, with three complete rows of areolae. Length, 3.75 mm.; width, 1.6 mm.

Color: General color whitish. Body above and beneath black. Antennae yellowish; the apical segment light brown. Legs yellowish; tarsi brownish. Hood and membranous margins of pronotum whitish. Elytra whitish, usually with a brown spot on the tumid elevation, sometimes faint or obsolete.

We have a form that seems to be a teneral specimen in which the areolae are opaque and of a creamy-white color.

Common throughout the state. The leaves of sycamore trees are often [illegible] whitened and wilted from their presence. We have specimens [illegible] Columbus, Cedar Point, Castalia, Put-in-Bay, Berea, Buckeye Lake, Zanesville, and Malta.

Corythucha [illegible] Uhler.

Tingis marmorata Uhler, [illegible] Soc. Nat. Hist., vol. XIX p. 415, 1878.

Antennae slender, beset with a few rather [illegible] long bristly hairs; first segment three times as long as the second; [illegible] apex. Hood strongly raised; constricted about the [illegible] globose. Membranous pronotal margins bullate about the middle, [illegible] at the anterior and posterior margins. Pronotum and base of triangular [illegible] distinctly punctured. Costal area of elytra unevenly reticulated, with two complete and a partial third series of areolae. Length, 3.4 mm.; width, 1.8 mm.

Color: Body black; the humeral region and pleural margins sometimes paler. Antennae yellowish. Legs yellowish; tarsi brownish. Hood and membranous pronotal margins lacteous; the nervures more or less embrowned. Elytra lacteous, with the centers of areolae hyaline, with four irregular, transverse, smoky-brown bands—the two terminal bands separated by a transverse row of hyaline areolae.

Berea, Cedar Point, Put-in-Bay, Bay Point, Castalia, Columbus, Zanesville, Malta, Buckeye Lake, Marietta, and North Kenova.

Corythucha juglandis Fitch.

Corythucha juglandis Fitch, Third Report, Ins. N. Y., p. 466, 1866.

Antennae beset with a few long bristly hairs; first segment slightly more than twice the length of the second. Rostral groove rounded at the apex; rostrum reaching the middle of the metasternum. Hood considerably raised, quite evenly reticulated, abruptly constricted about the middle; posterior portion globose. Membranous pronotal margins evenly reticulated, bullate about the middle. Pronotum and base of triangular process distinctly punctured; the apex of the latter reticulated. Median carina foliaceous, with a double series of areolae at the middle. Lateral margins of triangular process feebly raised anteriorly, with two or three areolae. Length 3.3 to 3.7 mm.; width 2 to 2.3 mm.

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Color: Antennae yellowish; apical segment sometimes brownish. Legs brownish; tips of tarsi brownish. Hood and membranous pronotal margins hyaline, the nervures yellowish with parts more or less embrowned. Pronotum yellowish. Elytra hyaline, with a transverse band on the costal area near the base, a spot on the tumid elevation, and more or less of a band on apical third brown.

A common species found on walnut and (sometimes) basswood. Malta (Drake), Jefferson (Sim), Columbus (Hine).

Corythucha celtidis nov. sp.

This species is very close to *C. juglandis* Fitch, but differs from the specimens that we have assigned to that species by the less elevated hood, the more numerous bristly hairs on the antennae, and the somewhat different markings at the tip of the elytra.

Antennae slender, beset with numerous, moderately long bristly hairs; first segment twice as long as the second; fourth segment swollen towards the apex. Rostral groove quite wide; rostrum reaching the meso-metasternal suture. Hood moderately raised, abruptly constricted about the middle; posterior portion globose, rather evenly reticulated; anterior portion triangular, more closely reticulated. Membranous pronotal margins broad, kidney-shaped, bullate about the middle, slightly raised at the anterior and posterior margins. Pronotum and base of triangular process coarsely and regularly punctured, the latter reticulated at the apex; sides of triangular process feebly raised anteriorly, with a few distinct areolae. Median carinae foliaceous, with a double row of areolae at the middle; costal area unevenly reticulated, with three complete rows of areolae. Length, 3.6 mm.; width, 1.8 mm.

Color: General color hyaline. Body above and beneath black. Legs yellowish; tips of tarsi embrowned. Antennae yellowish; terminal segment fuscous. Hood, membranous pronotal margins, and apex of triangular process hyaline, except nervures around two or three areolae brown. Pronotum and base of triangular process brownish. Elytra hyaline, a small vitta near anterior margin, posterior portion of tumid elevation, and more or less of a narrow indistinct band on distal third fuscous.

Described from a long series of specimens, taken on *hackberry* in the various stages of development at Columbus during Sept., 1903, by the senior author. We have two specimens taken by Mr. Kostir at Cedar Point.

Corythucha arcuata Say (Plate IX).

Tingis arcuata Say, Hem. New Harm., p. 27, 1832; Compl. Writ., Vol. I, p. 350, 1859.

Corythucha arcuata Morrill, Psyche, Vol. X, p. 127-132.

Antennae beset with a few long bristly hairs; first segment almost three times as long as the second; apical segment slightly swollen towards the apex. Hood moderately raised, rather evenly reticulated, abruptly constricted about the middle;

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posterior portion globose. Membranous pronotal margins broad, kidney-shaped, bullate about the middle, slightly raised at the anterior and posterior margins. Pronotum and base of triangular process distinctly and quite regularly punctured. Apex of triangular process reticulated; the sides feebly raised anteriorly, with a few areolae. Length, 3.1 mm.; width, 1.6 mm.

Color: Antennae yellowish; fourth segment brownish. Legs yellowish; tips of tarsi brownish. Hood hyaline, with one or two dorsal nervures more or less embrowned. Membranous pronotal margins hyaline, sometimes one or two areolae brown. Pronotum yellowish-brown. Elytra hyaline, with a band near the base, tumid elevation, and more or less of a band near posterior end fuscous.

A common species found feeding on oak and the leaves show whitish or yellowish-brown patches from their attacks. This species is quite variable in color. We have specimens with the hood, membranous pronotal margins, and the posterior portion of the elytra almost entirely hyaline.

No doubt common thruout the state. We have numerous examples from Columbus and Athens.

Corythucha pergandei Heidemann (Figs. 4 and 5).

Corythucha pergandei Heid., Proc. Ent. Soc., Wash., Vol. VIII, p. 10.

Antennae slender, the basal segment twice as long as the second. Rostrum reaching the meso-metasternal suture. Pronotal hood considerably raised, abruptly constricted about the middle; posterior portion globose, widely reticulated; anterior portion triangular, more closely reticulated. Membranous pronotal margins evenly reticulated, reniform, bullate about the middle, slightly raised at the anterior and posterior margins. Pronotum and base of triangular process deeply

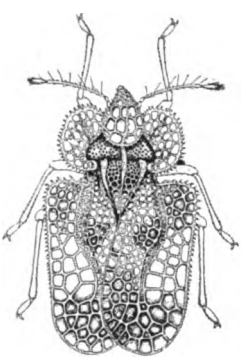

Fig. 4. Corythucha pergandei Heidemann, adult (after Heidemann).

punctured, the latter with the sides feebly raised anteriorly (a few distinct areolae) and with the apex irregularly reticulated. Median carina moderately raised, with five or six areolae and sometimes two additional ones formed by a

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little cross-vein dividing the middle cell. Elytra with the costal area very unevenly and widely reticulated. Length, 3.2 mm.; width, 1.6 mm.

Color: General color brownish. Body black, except the margins of the prosternum, the humeral area, and the last two abdominal segments fulvous. Antennae yellowish; the apical segment brownish. Legs yellow; the tips of tarsi brownish. Areolae of hood and membranous pronotal margins hyaline, a few slightly embrowned; nervures yellowish or brownish. Elytra hyaline; humeral area and a band across the apical third dark-fuscous with the centers of areolae hyaline.

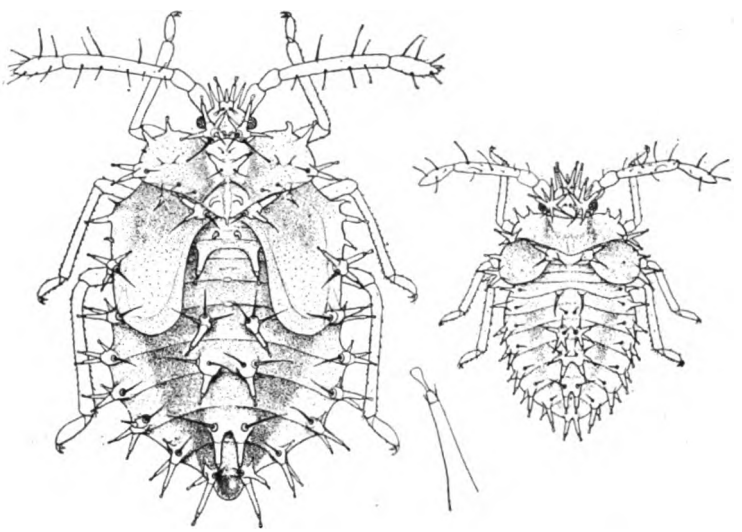

Fig. 5. Corythucha pergandei Heidemann, nymphs (after Heidemann).

One specimen, taken at Sugar Grove by the junior author. It is recorded as occurring on *Alnus.*

Corythucha crataegi spec. nov. (Plate X, fig. f).

This species was listed by Morrill in Psyche, Vol. X, p. 132, as a new subspecies of *C. arcuata* under the name of *Corythucha arcuata crataegi.* Morrill finds the eggs of the oak- and hawthorn-inhabitating species to be distinct and gives a brief description of the ova, but no description of the adult. We have a long series of both forms and find them to be distinct species.

Antennae slender, beset with numerous bristly hairs of various lengths; first segment about three times as long as the second; fourth segment swollen on the distal half. Rostrum reaching the meso-metasternal suture. Hood considerably raised, abruptly constricted about the middle; posterior portion globose, widely reticulated; anterior portion triangular, more closely reticulated. Membranous

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pronotal margins evenly reticulated, reniform, bullate about the middle, slightly reflected at the anterior and posterior margins. Pronotum coarsely and regularly punctured; triangular process reticulated, feebly raised on the sides anteriorly, with two or three areolae; median carina foliaceous, with one row of areolae and two additional ones formed by a small nervure dividing two middle cells. Elytra with the outer margin sinuate, very broadly rounded at the tip; costal area with three rows of areolae and a partial fourth at anterior end, widely reticulated; sutural area not very widely and unevenly reticulated. Length, 3.5 mm.; width, 1.7 mm.

Color: Body black, the apical segment of the abdomen and more or less of the sides of the abdomen flavous. Antennae yellow; distal half of apical segment brownish. Legs yellowish; tips of tarsi brownish. Hood hyaline; parts of the nervures and areolae brownish. Membranous pronotal margins yellowish, with a brown spot near the outer margin. Pronotum yellowish. Elytra hyaline; a band at anterior and one near posterior margin fuscous; sutural area slightly embrowned.

A common insect upon hawthorn. We have a long series, taken at Athens, Sept. 12th, 1905, by the senior author.

Corythucha contracta n. sp.

Readily distinguishable by the transverse black-fuscous bands near the anterior and posterior margins of the elytra and the elytra are narrowed posteriorly.

Antennae slender, beset with a few moderately long bristly hairs; first segment three times as long as the second; fourth segment moderately swollen towards the apex. Hood considerably raised, abruptly constricted about the middle; posterior portion globose, evenly reticulated; anterior portion triangular, more closely reticulated. Membranous pronotal margins broad, reniform, bullate about the middle, slightly reflected at the posterior margin. Pronotum and base of triangular process distinctly punctured; the sides of the latter feebly raised anteriorly, with a few distinct areolae. Elytra narrowed posteriorly; costal area very broad, with three complete and one partial series of areolae, very unevenly reticulated. Length, 3.25 mm.; width, 1.5 mm.

Color: General color griseus. Antennae yellowish; terminal segment brownish. Legs yellowish; tarsi brown. Pronotum and base of triangular process brownish. Elytra griseus, with transverse black-fuscous bands near the anterior and posterior margins.

One specimen, taken at Jefferson, Ashtabula Co., Aug. 8th, 1915 (Sim).

Corythucha pallida spec. nov.

Easily distinguishable from the other Ohio species by its pallid color.

Antennae beset with long bristly hairs of various lengths; fourth segment swollen towards the apex. Rostrum very long, almost reaching the end of the mesosternum. Membranous pronotal margins very broad, evenly reticulated, not

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very strongly bullate about the middle, slightly reflected at the posterior margins. Hood moderately raised, not very abruptly constricted about the middle. Median carina with one complete series of areolae and two cells divided near the middle forming double cells. Pronotum regularly and coarsely punctured. Apex of triangular process reticulated; the sides feebly raised anteriorly, with two or three small areolae. Costal area with three complete and one partial series of areolae, very unevenly reticulated. Length, 4.1 mm.; width, 2 mm.

Color: Body brown-black. Lateral portion of prothrax and terminal segment of abdomen ochraceous. Antennae yellowish; apical segment embrowned. Legs yellowish; tarsi slightly embrowned and usually darker at tips. Hood, membranous pronotal margins, and triangular process pallid. Elytra pallid, with an indistinct very light brownish band near the base. Length, 4 mm.; width, 2 mm.

Five specimens, taken on *linden* at Sugar Grove (Dr. Kellicott), and at Columbus (Prof. Hine).

Variety *ulmi?* We have numerous specimens taken on *Ulmus americanum* (Sanders) at Lisbon, Sept. 4th, 1903. They are slightly smaller and the transverse band near the base of the elytra is a little more distinct. There are also a few more erect spines on the membranous pronotal margins and elytra. The specimens seem to be slightly discolored and with the material in hand we do not feel warranted in separating it as a distinct species.

Corythucha pruni spec. nov.

Close to *C. aescula,* but readily separated from it by the narrower and much less elevated hood, the shorter first segment of the antennae, and the slightly raised median carina at the middle.

Antennae beset with numerous bristly hairs; first segment slightly more than twice the length of the second; fourth segment swollen on the distal half. Rostrum reaching the meso-metasternal groove. Hood, narrow, moderately elevated, rather widely reticulated, not very abruptly constricted about the middle; posterior portion subglobose; anterior portion triangular. Membranous pronotal margins very broad, evenly reticulated, bullate about the middle, slightly raised at the anterior and posterior margins. Pronotum and base of triangular process coarsely punctured, the sides of the latter feebly raised anteriorly with three or four areolae. Median carina foliaceous, not strongly elevated about the middle. Elytra broadly rounded at the tip, the outer margin sinuate; costal area widely and unevenly reticulated; with three complete and a partial row of areolae. Length, 4.2 mm.; width, 2.3 mm.

Color: Body black; apical abdominal segment fulvous. Antennae yellowish; the apical segment embrowned. Legs yellowish; tarsi embrowned. Hood hyaline; the nervures, especially on dorsal surface, more or less embrowned and a few of the areolae somewhat clouded. Membranous pronotal margins hyaline, with one or two small spots near the outer margin brown. Pronotum yellowish. Elytra hyaline; a band near the anterior and one near the posterior margins, and more

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or less of sutural area fuscous; the apical band with one or two large areolae hyaline.

Described from numerous specimens, taken on the wild cherry, *Prunus serotina,* at Washington, D. C., by Prof. Hine.

Corythucha aesculi n. sp. (Plate X, fig. g).

Moderately large and broad. Antennae slender, sparsely beset with a few long bristly hairs; first segment three times as long as the second; second very short; fourth segment moderately swollen towards the apex. Rostral groove rather broad; rostrum reaching between the intermediate coxae. Membranous pronotal margins broad; reniform, unevenly reticulated, bullate about the middle, slightly reflected at the anterior and posterior margins. Hood strongly raised, abruptly constricted about the middle; posterior portion very large, globose, quite widely reticulated; anterior portion triangular, more closely reticulated on the sides, directed almost vertically downward. Median carina foliaceous, with one complete and a partial second (about the middle) series of areolae. Pronotum coarsely punctured. Sides of triangular process feebly raised anteriorly, with a few distinct areolae. Costal area of the elytra very broad, unevenly reticulated. with three complete and a partial fourth series of areolae. Length, 4 mm.; width, 2 mm.

Color: General color brownish. Body above and beneath black. Antennae yellowish; terminal segment light fuscous. Legs yellowish; tips of tarsi brownish. Pronotum embrowned. Membranous pronotal margins hyaline, with one or two small areas about the middle near the outer margin brown. Hood more or less embrowned, with the center of some of the areolae hyaline; nervures yellowish or brownish. Elytra hyaline, with a broad transverse band near the base and apex fuscous; in the latter band a few of the areolae hyaline.

Found in great numbers and in the various stages of metamorphosis on the under sides of buckeye leaves, *Aescula glabra,* during the month of April, May, and June, 1915 and 16, on the university campus and at Minerva Park, north of Columbus. This species hibernates in the adult stage; it can be found feeding on the leaves in early spring just as soon as they have partially opened.

Corythucha bulbosa n. sp. (Plate X, fig. e).

From any member of the genus known to us it is easily differentiated by its larger size, the much larger pronotal hood, and dark-fuscous color. According to Mr. H. M. Parshley (Harvard University) this species was given the manuscript name, *C. carbonata,* by Uhler, but no description was ever published.

Antennae slender, beset with a few long bristly hairs; first segment three times as long as the second; fourth segment slightly incrassated, the bristly hairs becoming shorter and more numerous towards the apex. Rostral sulcus wide; rostrum reaching beyond the meso-metasternal suture. Hood very large, very

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strongly raised, very abruptly constricted about the middle; posterior portion very large and wide, globose, very unevenly reticulated; anterior portion triangular, quite evenly reticulated, directed nearly vertically downwards. Membranous pronotal margins very broad, bullate about the middle, slightly reflected at the anterior and posterior margins. Pronotum and base of triangular process deeply and coarsely punctured; the sides of the latter slightly raised anteriorly, with a single areola at the base. Elytra very broad; costal area with three complete and a partial series of areolae. Length, 4.6 mm.; width, 2.6 mm.

Color: General color dark-fuscous. Body above and beneath black. Antennae yellowish; apical segment brownish. Legs yellowish; tips of tarsi brownish. Hood embrowned; the center of a few areolae hyaline. Membranous pronotal margins dark-brown; one or two rows of areolae on the inner margin hyaline. Pronotum and base of triangular process black-brown; apex of the latter yellowish. Elytra dark-brown; the centers of two large areolae near the apex, a few areolae on inner margin of costal area, dark-brown.

Described from numerous specimens, taken at Sugar Grove, May 15th, 1915, by Mr. Delong. We have specimens from Sugar Grove, 1902 (Osborn), and Plummer's Island, Maryland (taken July 31st, 1906, by D. H. Clemmons).

Genus **Gargaphia** Stål.

Gargaphia Stål, Stett. Ent. Zeit., p. 324, 1862; Enum. Hem., Band. III, p. 119 et 124, 1873.

The genus *Gargaphia* can be separated from the rest of the *Tingitidae* by the interrupted rostral sulcus between the meso- and metasternum by a prominent transverse, sinuous carina.

KEY TO THE OHIO SPECIES OF GARGAPHIA.

1. Size small (length, 3.4 mm.; width, 1.6 mm.); head with short blunt spines ..... *G. angulata* Heidemann
   Size larger (4 mm. or longer); head with long, acute spines..... 2
2. Membranous pronotal margins broadly rounded; antennae testaceous, except terminal segment black..... *G. tiliae** Walsh
   Membranous pronotal margins more narrowly rounded; first segment of antennae black, second testaceous, third yellowish-white, fourth black.. *G. solani* Heidemann

Gargaphia angulata Heidemann (Fig. 6).

Gargaphia angulata Heidemann, Can. Entom., Vol. XXXI, p. 301; Chittenden, Bull. 23, New Series, U. S. Div. Entom. (fig. 9), p. 32-33.

Head with three, short, rather thick, obtuse spines in front between the antennae; antennae slender, beset with fine hairs; first segment nearly twice as long as the second; third segment about four times as long as the fourth. Pro-

*As we have no specimens of *G. amorphæ* Walsh, we do not try to separate it from *G. tiliae* in this key.

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notum finely punctate, tricarinate; the three carinae foliaceous. Membranous pronotal margins, moderately wide, angularly dilated behind the middle, with two rows of areolae at the narrowest portion and with three series at the widest part. Elytra oblong-oval, the sides abruptly converging to the base, broadly rounded at the apex. Length, 3.4 mm.; width, 1.6 mm.

Fig. 6. Gargaphia angulata Heidemann (after Chittenden).

Color: Body black beneath. Head black; spines white. Antennae testaceous; apical segment blackish. Legs testaceous; tips of tarsi blackish. Pronotum blackish; carinae testaceous, the median carina posteriorly whitish. Nervures of elytra, membranous pronotal margins, and hood testaceous; three or four transverse nervures of elytra blackish; areolae quite hyaline.

No specimens have been taken in the state. It has been taken in the eastern and southern part of the United States on bean. We have specimens from Clarksville, Tennessee, (DeLong), Beach Bluff, Mass., (Parshley), Washington, D. C., (Heidemann), Bedford, Penn., and Balsam, N. C.

Gargaphia tiliae Walsh.

Tingis tiliae Walsh, Proc. Entom. Soc. Phil., Vol. III, p. 408, 1864.
Gargaphia fasciata Stål, Enum. Hem., Band. III, p. 125, 1873.

We have found *fasciata* Stål to be a synonym of *tiliae* Walsh; this has been confirmed by Mr. Heidemann in a letter to the senior author.

Head with five long, acute spines. Antennae long, slender, hairy; first segment greatly swollen, about three times the length of the second; second segment short, less swollen; third segment very long, slender; fourth segment slightly swollen towards the tip. Rostrum reaching a little beyond the middle of the metasternum. Pronotum tricarinate, the outer carinae slightly sinuate. Membranous pronotal margins foliaceous, broadly reflexed, composed of four irregular series of areolae. Elytra broadly rounded at the tip; costal area broad, unevenly reticulated; discoidal area not quite reaching the middle of the elytra. Length, 4.2 to 4.6 mm.; width, 2.1 to 2.2 mm.

Color: General color pale yellowish-brown. Head more or less blackish. Eyes black. Body beneath blackish or brownish-black. Antennae pale yellowish-brown;

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fourth segment blackish. Pronotum blackish: membranous margins, hood, and apex pale yellowish-brown. Legs pale yellowish-brown; tips of tarsi blackish. Nervures of elytra pale yellowish-brown; more or less of three or four transverse nervures near basal third dark-brown or black; areolae hyaline.

Common on Basswood; Cedar Point (Kostir), Berea (Drake), Jefferson (Sim), Columbus (Drake), Oxford (Shideler), Milan and Sandusky (Osborn), and Vinton (Hine).

Gargaphia amorphae Walsh.

Tingis amorphae Walsh, Proc. Entom. Soc. Phil., Vol. III, p. 408, 1864.

This species is unknown to us and we include the original description of Dr. Walsh.

"Differs from the above [*tiliae*] only in the large, basal, carinate cell of the elytra, terminating behind nearly in an angle of 60-80°, and in the veins of the wings, both those on the basal side of the middle and those at the tip, being on the average of specimens much more deeply stained with black, though individuals of the two species occur which are identical in this character. Length about .15 inch. Eighteen specimens on Amorpha fructicosa."

Gargaphia solani Heidemann (Fig. 7).

Gargaphia solani Heidemann, Proc. Entom. Soc. Wash., Vol. 15, p. 136; Fink (Life Hitory), Bull. 239, U. S. Dept. Agr.

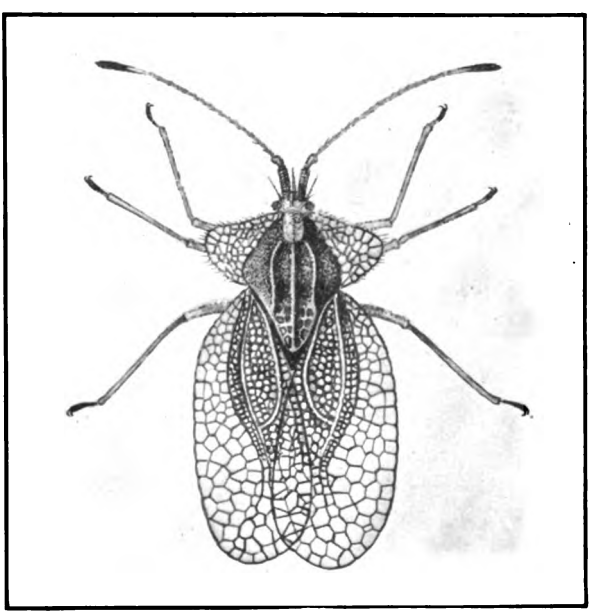

Fig. 7. Gargaphia solani Heidemann (after Fink).

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Head deeply punctured, with five long acute spines. Antennae long, slender, hairy; first segment greatly swollen, about three times the length of the second; second segment short, much less swollen; third segment more than four times the length of the fourth; fourth segment fusiform. Pronotum feebly convex, with three longitudinal carinae. Lateral membranous pronotal margins angularly expanded, somewhat broadly reflexed, with two to five series of irregular areolae. Pronotal hood rather large, covering the posterior part of the head, with fine, minute areolae. Head, pronotum, and membranous pronotal margins more or less densely covered with fine, soft hairs. Elytra broadly rounded at the tip, feebly sinuate near the base; discoidal area pyriform, almost reaching the middle of the elytra. Length, 4mm.; width, 2 mm.

Color: Body dark brown. Antennae—first segment black; second segment testaceous; third segment yellowish-white; fourth segment black at the apex. Pronotum black; carinae yellowish. Legs pale yellow. Lateral membranous margins of the pronotum and nervures of the elytra yellowish, some of them more or less embrowned or blackish; areolae somewhat hyaline.

This species is commonly known as the eggplant lace-bug. According to Fink, this lace-bug destroys from 10 to 15 per cent of the eggplant crop in the vicinity of Norfolk, Va.

Very common in the southern part of the state; taken on the horse nettle *(Solanum carolinense)* at Malta, Apple Grove, North Kenova, Hanging Rock, Crown City by the junior author; and in Clermont Co. by Mr. Jesse Robinson.

Genus **Galeatus** Curtis.

Galeatus Curtis, Entom. Mag., p. 196, 1833.
Galeatus Stål, Enum. Hem., Band. III, p. 118, 1873.

Head armed with long, acute spines. Rostral sulcus rather wide, uninterrupted; rostrum long and slender. Antennae and legs long and slender. Lateral margins of the pronotum foliaceous, with a few large areolae forming a single series. Pronotal hood extending over the median anterior and posterior portions of the pronotum; discal hood large, globose, divided behind. Median carina foliaceous. Elytra extending nearly one-half beyond the apex of the abdomen, outer margin near the base abruptly narrowed, broadly rounded at the apex, composed of very large areolae; costal area wide, composed of a single series of areolae; inner margin of the subcostal area jointly raised with the margins of discoidal and sutural areas.

This genus can be readily differentiated from the allied genera by the very large areolae. Only one Nearctic species has been described.

Galeatus peckhami Ashmead (Plate X, fig. c).

Sphaerocista peckhami Ashmead, Entom. Amer., Vol. III, p. 156, 1888.

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Galeatus peckhami Van Duzee, Canad. Entom., Vol. XXI, p. 5., 1889; Uhler, Proc. U. S. Nat. Mus., Vol. XXVII, p. 364, 1904; Parshley, Entom. News, Vol. XXVII, p. 105, 1916

Head with five very long acute spines. Antennae slender, beset with numerous short hairs; first segment swollen, twice the length of the second; second short, slightly less swollen; third segment very long, slender; fourth segment rather long, apical third slightly swollen. Rostrum long, almost reaching the end of the rostral groove. Membranous pronotal margins greatly dilated, composed of five areolae (anterior and posterior areolae very small, the other three large and transverse). Pronotal hood extending slightly over the base of the head. Discal hood very large, globose, divided in the middle behind. Median carina foliaceous, composed of a single series of areolae, extending from the posterior end of the pronotum forward between the divided discal hood. Elytra with the basal angle deeply sinuate, composed of large areolae; costal area wide, composed of a single row of mostly large quadrate areolae. Length, 4.2 mm.; width, 2.3 mm.

Color: Head and body black. Antennae yellowish; apical segment embrowned. Legs yellowish; tarsi fuscous. Nervures of hood, pronotal margins, and elytra more or less embrowned or fuscous; areolae hyaline, except a few clouded ones on the discal vesicle.

This curious insect has not been taken in the state. It is recorded for Massachusetts (Parshley), Canada (Van Duzee), Wisconsin (Ashmead), and New Mexico (Uhler).

Genus **Leptostyla** Stål.

Leptostyla Stål, Enum. Hemip., Band. III; p. 120, 1873.

Leptostyla Champion, Biol., Centr.-Amer., Rhynch., Vol. II, p. 11.

The genus includes three Nearctic species. Antennae long, slender; first segment from two to five times as long as the second; second segment short; third segment very long, cylindrical; fourth segment more or less swollen towards the apex, longer than the first. Rostral sulcus uninterrupted by a transverse ridge between the meso- and metasternum; rostrum reaching the meso-metasternal suture, sometimes shorter or longer. Pronotum tricarinate; membranous margins moderately wide. The hood varies in size. Elytra without a tumid elevation, constricted about the middle, gradually widening towards the apex, extending far beyond the tip of the abdomen; costal area more or less widely reticulated, with one, two, three, or more irregular rows of areolae; subcostal area sometimes very narrow, with one, two, or three rows of areolae; discoidal area not reaching the middle of the elytra, with three or four rows of small areolae; sutural area more or less widely reticulated. Wings not reaching or extending slightly beyond the apex of the abdomen.

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KEY TO THE NEARCTIC SPECIES OF LEPTOSTYLA.

1. Costal area of the elytra with a transverse, fuscous fascia just before the middle; first segment of the antennae twice as long as the second..... *L. clitoriae* Heidemann

   Costal area of the elytra without a transverse fascia; first segment of the antennae three or slightly more than three times as long as the second.. 2

2. Costal area of the elytra white, size small (length, 2.75 mm.; width, 1 mm.) *L. oblonga* Say

   Veins of costal area more or less embrowned; size larger (length, 3 mm.; width, 1 mm.).....*L. heidemanni* n. sp.

Leptostyla oblonga Say.

Tingis oblonga Say, Journ. Acad. Sci. Phil., Vol. IV, p. 325; Compl. Writ., Vol. II, p. 248, 1859.

This species can be distinguished from *L. clitoriae* Heid. by its larger size, the long acute spines on the head, the much longer first segment of the antennae, and the white costal area of the elytra. From *L. heidemanni* n. sp., it differs in its smaller size, white spines, and white costal area of the elytra; the costal area has one complete and a partial series of areolae about the middle. Length, 2.75 mm.; width, 1 mm.

No specimens have been taken in the state; we have included it as a form that probably occurs here.

Leptostyla heidemanni n. sp.

Close to *L. oblonga* Say, but differing in the more swollen first segment of the antennae, the four long acute spines on the head with black tips, and the costal area of the elytra has two almost complete series of areolae.

Head short, with four long acute spines. Antennae rather long; first segment three times as long as the second; second segment very short; third very long; fourth segment swollen on the distal two-thirds. Rostrum reaching the middle of the mesosternum. Membranous pronotal margins moderately wide, recurved, converging anteriorly, with two series of areolae. Hood oval, considerably raised. Pronotal disc coarsely and regularly punctured. The three longitudinal carinae raised, each with a complete series of areolae. Elytra with three large areolae near the apex; costal area with one complete and another nearly complete series of areolae, very unevenly reticulated; subcostal and discoidal area closely and evenly reticulated; sutural area rather broad, unevenly reticulated. Length, 3 mm.; width, 1 mm.

Color: Body black. First segment of the antennae fulvous; second and third segment yellowish; fourth segment fuscous, except proximal third yellowish. Legs yellowish; tarsi more or less embrowned. Disc of pronotum black. Membranous pronotal margins hyaline, a few nervures on inner humeral area brown.

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Hood hyaline; the nervures brown. Elytra hyaline, a spot on the discoidal area (usually extending over in the subcostal area), transverse nervures of costal area, and nervures of sutural area mostly fuscous.

Described from two specimens, one from Arkansas (Osborn collection) and one from Washington, D. C. (Heidemann). We have just received a specimen from Mr. Parshley that was collected at Newton, Mass.

Leptostyla clitoriae Heid. (Fig. 8).

Leptostyla clitoriae Heidemann, Proc. Ent. Soc. Wash., Vol. XIII, p. 180.
Leptostyla costofasciata Drake, Ohio Journ. Sci., Vol. XVI, p. 326, 1916.

Head with three short, rather blunt spines—the two smaller, slightly converging spines situated just above the antennae (one on the inner side of each); the larger frontal spine is just above the other two and extends a little farther forward. Antennae slender, about one-half the length of the body; first segment swollen,

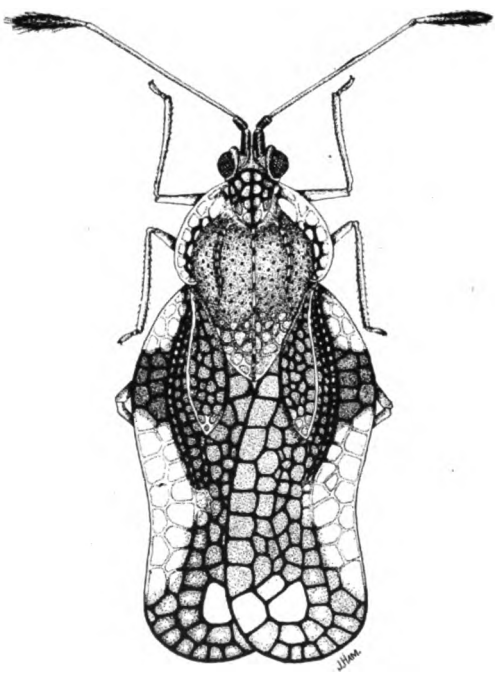

Fig. 8. Leptostyla clitoriae Heid.

twice as long as the second; fourth segment fusiform. Rostrum almost reaching the meso-metasternal suture. Pronotum norrowed anteriorly, with the membranous margins moderately wide, recurved, converging anteriorly, with two rows of areolae; hood oval, considerably raised, with about eight areolae on each side; the three longitudinal carinae raised, composed of a single row of areolae. Costal area of the elytra

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moderately wide, rather widely reticulated, with two rows of areolae; subcostal area rather closely reticulated; discoidal area more closely reticulated; sutural area unevenly reticulated, with two large areolae near the posterior end. Wings not longer than the abdomen. Length, 2.2 mm.; width, 9 mm.

Color: Body black. Legs yellowish; tips of tarsi fuscous. Antennae—first and second segments testaceous; third segment yellowish; fourth segment fuscous. Hood whitish, nervures more or less testaceous; membranous pronotal margins whitish, the nervures of four or five areolae on humeri brownish. Elytra whitish, with a rather broad, transverse, dark-fuscous fascia just before the middle on the costal area; nervures of subcostal, discoidal, and sutural area dark-fuscous. The apex of the elytra dark fuscous with the center of the areolae whitish.

We have specimens from Knoxville, Tennessee and Calhoun, South Carolina.

Genus **Leptobyrsa** Stål.

Leptobyrsa Stål. Enum. Hemip., Band. III, p. 119, 1873.
Leptobyrsa Champion, Biol. Centr.-Amer., Rhynch., Vol. II, p. 25.

Head with, at most, five rather short spines. Antennae slender; the basal segment long; third segment very long. Rostral groove uninterrupted, broad on the meso- and metasternum and closed behind; rostrum rather short. Pronotal hood large, extending prominently above the head. Membranous pronotal margins foliaceous, broadly rounded. Posterior portion of the pronotum abbreviated, obtuse at the tip. Elytra twice or nearly twice as long as the abdomen, broad, more or less widely reticulated, strongly rounded at the base and apex. Wings short or obsolete.

The genus contains only one described Nearctic species.

Leptobyrsa explanata Heidemann (Plate VIII)

Leptobyrsa explanata Heidemann, Proc. Entom. Soc. Wash., Vol. II, p. 105.

Body short, oval in the female and more elongate in the female. Head rather short, with three frontal spines and two other more slender ones extending from behind the eyes towards the front. Antennae long, slender, finely pilose, the first two segments swollen; first segment twice the length of the second; third segment a little more than three times the length of the fourth. Pronotum feebly convex, coarsely punctured; membranous margins strongly rounded behind, reflexed, widening moderately at the sides, with two or three rows of areolae; hood not much inflated, covering the head (except eyes), with quite large areolae at sides near the top and smaller ones near the base, cristate and slightly tapering towards the front. The three pronotal carinae foliaceous; the median carina strongly raised, as high as the crest of the hood, rounded on top and slowly declining towards the apex of triangular portion of pronotum; outer carinae feebly raised, one-half as long as the median carinae. Elytra ovate, strongly rounded from base to apex, broadest behind the middle. Crest of hood, lateral margins of pronotum,

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outer margins of elytra, and most of the nervures beset closely with very fine, long hairs. Length, 3.6 mm.; width of each elytron across widest part, 1.4 mm.

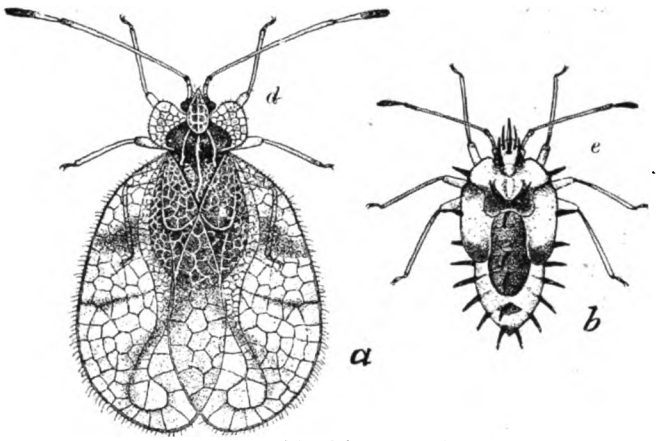

Plate VII.—Leptobyrsa explanata Heid. Fig. a, adult; fig. b, nymph (after Heidemann).

Color: Body shining black. Bucculae yellow. Antennae yellowish; apex infuscated. Pronotum shining black; carinae yellowish. Hood, membranous pronotal margins, and elytra yellowish; areolae semitranslucent, pale yellow.

Warren, Ohio, July 15th, 1897 (H. B. Perkins).

Genus **Leptophya** Stål.

Leptophya Stål, Enum. Hem., Band. III, p. 121, 1873.

Antennae rather stout; first segment less than twice the length of the second; second segment short; third segment not at all slender; fourth segment fusiform. Rostral sulcus uninterrupted by a transverse ridge, open at the tip. Pronotum closely reticulated, with a single, median carina; lateral margins not foliaceous. Pronotal hood very broad, extending over the base of the head. Elytra narrowed at the base, broadly rounded at the tip, a little longer than the abdomen. Wings extending beyond the apex of the abdomen.

The genus contains only one described Nearctic species.

Leptophya mutica Say (Plate X, fig. b).

Leptophya mutica Say, Hem. New Harm., p. 26, 1832; Compl. Writ., Vol. I, p. 349, 1859.

Head with two spines deflected against its surface. Antennae rather stout, about of a uniform thickness; first and second segments about equal in length; third segment long, cylindrical; fourth segment fusiform. Rostrum reaching the

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middle of the mesosternum. Pronotum very closely reticulated; apex of the elytra more widely reticulated. Length, 3 mm.; width, 1.1 mm.

Color: General color grayish-brown. Body beneath dusky. Elytra grayish-brown, with a spot or band near the middle and the nervures at tip dark-brown.

No specimens have been collected in the state, altho the species probably occurs as it has been taken in Indiana.

Genus **Physatochila** Fieber.

Physatochila Stål, Enum. Hem., Band. III, p. 120, 1873.

Head with the spines bent down against its surface. Antennae moderately slender; first segment swollen, less than twice the length of the second; second segment short, less swollen; third segment very long, slender; fourth segment fusiform. Rostral groove uninterrupted, open at the tip. Hood moderately large, extending over a small portion of the head. Pronotum closely reticulated, with three longitudinal carinae; membranous margins foliaceous, obtusely rounded, reflexed back against the surface of the pronotum. Elytra narrowed at the base, broadly rounded at the tip, extending beyond the apex of the abdomen; subcostal area very long, narrow; discoidal area extending beyond the middle of the elytra. Wings longer than the abdomen.

KEY TO THE SPECIES OF PHYSATOCHILA.

Rostrum reaching beyond the first segment of the abdomen; elytra gray-brown, the nervures more or less fuscous.....*P. plexa* Say

Rostrum reaching between the intermediate coxae; elytra dull-brown, concolorous .....*P. brevirostris* n. sp.

Physatochila plexa Say.

Physatochila plexa Say, Hem. New Harm., p. 26, 1832; Compl. Writ., Vol. I, p. 349.

Physatochila plexa Stål, Enum. Hem., Band. III, p. 129, 1873.

Head with five spines bent down against its surface. Antennae moderately long; first segment less than twice the length of the second. Rostrum very long, reaching the middle of the second segment of the abdomen. Reflexed pronotal margins extending to or slightly over the outer longitudinal carina. Elytra reaching a little beyond the apex of the abdomen; costal area with three complete or two and a partial third irregular series of areolae. Wings extending a little beyond the apex of the abdomen. Length, 3.4 mm.; width, 1.5 mm.

Color: General color grayish-brown and more or less marked with fuscous. Body beneath brownish. Antennae brownish; apex of terminal segment fuscous. Legs brownish; tarsi darker. Pronotum and elytra grayish-brown; nervures marked with fuscous.

This species differs from *P. brevirostris* by its more oval shape, the longer rostrum, and the shorter elytra and wings.

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We have no Ohio specimens, but as it was described from Indiana we have included it as a form that probably occurs in the state. We have specimens from Fairfax, Iowa; Agricultural College, Mich.; Ottawa, Canada; and Berkley Springs, W. Va.

Physatochila brevirostris spec. nov.

From its only Nearctic congener, *P. plexa* Say, it is readily separated by its broader and less oval shape, the much shorter rostrum, the three quite regular series of costal areolae, and the concolorus elytra.

Antennae moderately slender; first segment swollen, slightly longer than the second; second segment short, less swollen; third segment very long, cylindrical; fourth segment fusiform. Rostral sulcus moderately wide, open at the apex; rostrum reaching between the intermediate coxae. Pronotum closely reticulated; the three longitudinal carinae slightly raised, composed of a single series of small areolae. Elytra narrowed at the base, very broadly rounded at the tip, considerably longer than the abdomen; costal area composed of three quite regular series of areolae; subcostal area very long, narrow, composed of three incomplete series of areolae; discoidal area reaching beyond the middle of the elytra. Wings considerably longer than the abdomen. Length, 3.2 mm.; width, 1.6 mm.

Color: General color dull brown. Body beneath brownish. Legs dull brown; tarsi fuscous. Antennae dull brown; apex of fourth segment black. Hood, reflexed pronotal margins, and pronotum dull brown, a few small areas slightly darker. Elytra dull brown.

Described from two specimens, one taken at Chillicothe (Ross Co., O.), May 21st, 1904, by Mr. O. H. Swezey, and the other at New York City, N. Y., May 20th, 1889, by Mr. E. B. Southwick.

Genus **Melanorhopala** Stål.

Melanorhopala Stål, Enum. Hemip., Band. III, p. 130, 1873.

Head armed with five deflected spines. Rostral groove uninterrupted. Antennae stout, long, clavate or subclavate; third segment very long, slightly curved, more or less swollen at the apex; fourth segment conical or fusiform. Pronotum closely reticulated, with three longitudinal carinae; sides foliaceous, reflected back vertically, or against the sides of the pronotum. Elytra narrowed at the base, apex narrowed or obliquely rounded; costal area composed of a single series of areolae; subcostal area narrow, with two series of areolae; discoidal area reaching beyond the middle of the elytra.

KEY TO THE SPECIES OF MELANORHOPALA.

1. Antennae clavate; apex of third segment greatly swollen, the fourth segment conical; membranous pronotal margins reflected, vertical (Plate VIII, fig. A).....*M. clavata* Stål

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Antennae subclavate; apex of third segment slightly swollen, the fourth segment fusiform; membranous pronotal margins reflected back against or nearly against the surface of the pronotum..... 2

2. Antennae very long (Plate VIII, fig. B).....*M. lurida* Stål
Antennae much shorter (Plate VIII, fig. C).....*M. uniformis* Stål

Melanorhopala clavata Stål (Plate VIII, fig. A; Plate X, fig. d).

Tingis (Melanorhopala) clavata Stål, Enum. Hemipt., Band. III, p. 130, 1873.

Antennae long clavate; first segment strongly swollen one and a half times the length of the second; second segment less swollen, short; third segment long, slender, greatly swollen at the apex; fourth segment conical. Membranous pronotal margins reflected back, vertical. Length, 5 to 5.3 mm.; width, 1.9 to 2.1 mm.

Color: Dull yellow-brown; the swollen portion of third segment and apical segment black.

We have specimens from Point Pleasant and Westfield, N. J., and Newton, Mass. No specimens have been taken in the state.

Melanorhopala lurida Stål (Plate VIII, fig. B).

Tingis (Melanorhopala) lurida Stål, Enum. Hemipt., Band. III, p. 131, 1873.

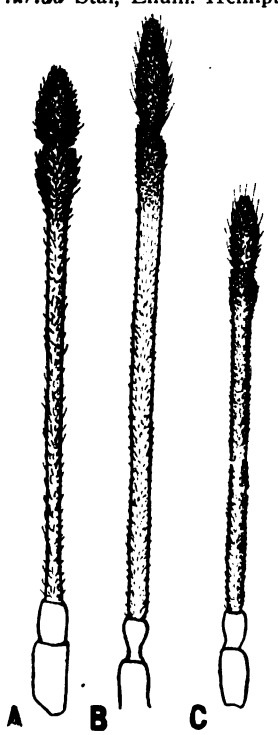

Plate VIII.—Antennae. A, Melanorhophora clavata Stal; B, M. lurida Stal; C, M. uniformis Stål.

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Antennae very long; second segment small at the base and swollen at the apex; third segment very long, very slightly swollen at the apex; fourth segment fusiform, longer than in *clavata* or *uniformis*. Membranous pronotal margins reflected back against or nearly against the surface of the pronotum. Length, male 5.5 mm., female 5.8 mm.; with, male 1.9 to 2 mm., female 2.1 mm.

Color: Dull yellow-brown, slightly darker than *clavata* or *uniformis;* the apex of the third segment and fourth segment black.

Two specimens, male and female taken at Castalia, O., by Mr. DeLong. This species was listed for the state as *clavata.* We have two specimens from New York City, N. Y. (E. B. Southwick).

Melanorhopala uniformis Stål (Plate VIII, fig. C).

Tingis (Melanorhopala) uniformis Stål, Enum. Hemipt., Band. III, p. 131, 1873.

Antennae considerably shorter than in *clavata* or *lurida;* second segment two-thirds the length of the first, less swollen; third segment much shorter than *clavata* or *lurida,* slightly swollen at the tip; fourth segment fusiform. Membranous pronotal margins reflected back against or nearly against the surface of the pronotum. Length, 5.5 mm.; width, 2 mm.

Color: Dull yellow-brown; the apex of the third segment and fourth segment black-brown.

This species was described from specimens taken in Illinois. We have one specimen from South Dakota.

Genus **Alveotingis** gen. nov.

Head with, at least, five spines; eyes large, strongly granulate. Antenniferous tubercles very large and long, resembling the basal segment of the antennae. Antennae strongly swollen, more than one-half the length of the body; first segment about twice the length of the second; second segment very short; third segment very long, more strongly swollen, largest; fourth segment very short, conical. Rostral sulcus rather broad, uninterrupted, open behind. Pronotum narrowed in front, with three longitudinal carinae, reticulated, except the antero-lateral areas); anterior margin with a single series of areolae; lateral margins foliaceous, composed of a single series of areolae, reflexed back against or nearly against the sides of the pronotum; posterior portion very broad, triangular. Legs long and robust. Elytra strongly convex; nervures strongly raised; costal area composed of a single series of areolae; discoidal, sutural, and subcostal areas not differentiated.

Type of genus, *Alveotingis grossocerata* n. sp.

Alveotingins grossocerata spec. nov. (Fig. 9).

Head with five spines—a single median spine between the eyes, two short converging spines between the antenniferous tubercles, and two longer deflected

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spines inserted close to the pronotum and extending along the inner side of the eyes. Rostral sulcus rather wide, uninterrupted. Eyes large, subglobose, rather coarsely granulate. Antenniferous tubercles very large and long, appearing somewhat like the first antennal segment. Antennae very stout, more than one-half the length of the body, densely beset with short decumbent hairs; first segment almost twice the length of the second, slightly more swollen than the second; second segment very short; third segment very long, about one and two-thirds the length of the other three-conjoined; fourth segment very short, conical. Legs very long and robust. Pronotum tricarinate, rather coarsely reticulated; median carina raised, composed of a single series of small areolae and becoming obsolete pos-

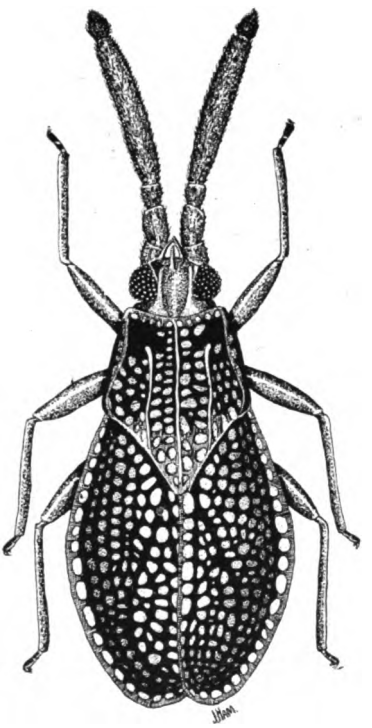

Fig. 9. Alveotingis grossocerata n. sp.

teriorly, reaching from the base to the apex of triangular process; discal carinae sinuate, extending from near the base to sides of triangular process, composed of a single series of small areolae; two series of areolae between the median and lateral carinae. Membranous pronotal margins reflected back against or nearly against the pronotum. Elytra broad, very strongly convex, outer margin rounded; costal area composed of a single series of large areolae; the rest of the elytra rather coarsely reticulated. Length, 2.8 mm.; width, 1.2 mm.

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Color: General color grayish-fuscous. Body dull-black. Nervures of pronotum and elytra sooty-black; areolae whitish. Antennae and legs grayish-fuscous.

Described from one specimen, taken at Orono, Maine, Aug. 5th, 1913, by the senior author. The body of this species is much thicker than that of any other American Tingitid.

Date of publication, June 28th, 1916.

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EXPLANATION OF PLATE IX.

Corythucha arcuata Say (after Morrill).

Fig. 1. Laterval view of egg.

Fig. 2. Apical end of egg showing cap.

Fig. 3. Nymph, first instar.

Fig. 4. Trumpet-shaped spine, arising from a subconical base.

Fig. 5. Nymph, second instar.

Fig. 6. Nymph, third instar.

Fig. 7. Nymph, fourth instar.

Fig. 8. Trumpet-shaped spine arising from a long thick protuberence.

Fig. 9. Nymph, fifth instar.

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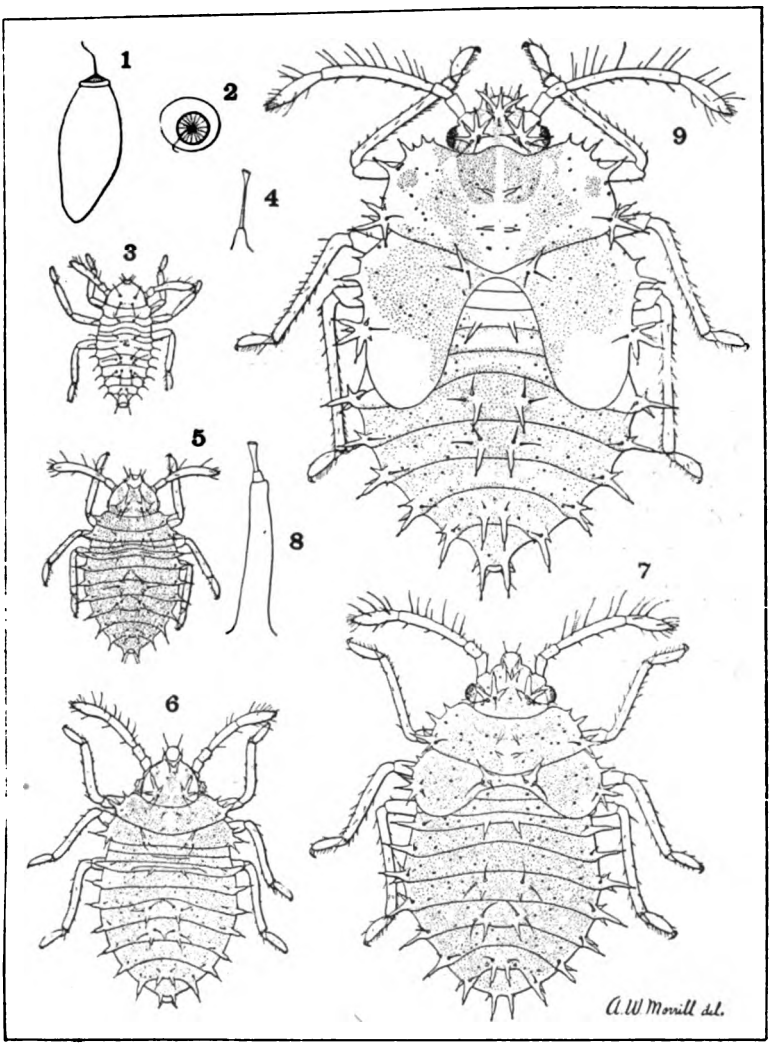
Ohio Biological Survey Vol. II, Plate IX.



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EXPLANATION OF PLATE X.

Fig. *a*. Piesma cinerea Say.

Fig. *b*. Leptophya mutica Say.

Fig. *c*. Galeatus peckhami Ashmead.

Fig. *d*. Melanorhopala clavata Stål.

Fig. *e*. Corythucha bulbosa spec nov.

Fig. *f*. Corythucha crataegi spec. nov.

Fig. *g*. Corythucha aesculi spec. nov.

Fig. *h*. Corythucha ciliata Say.

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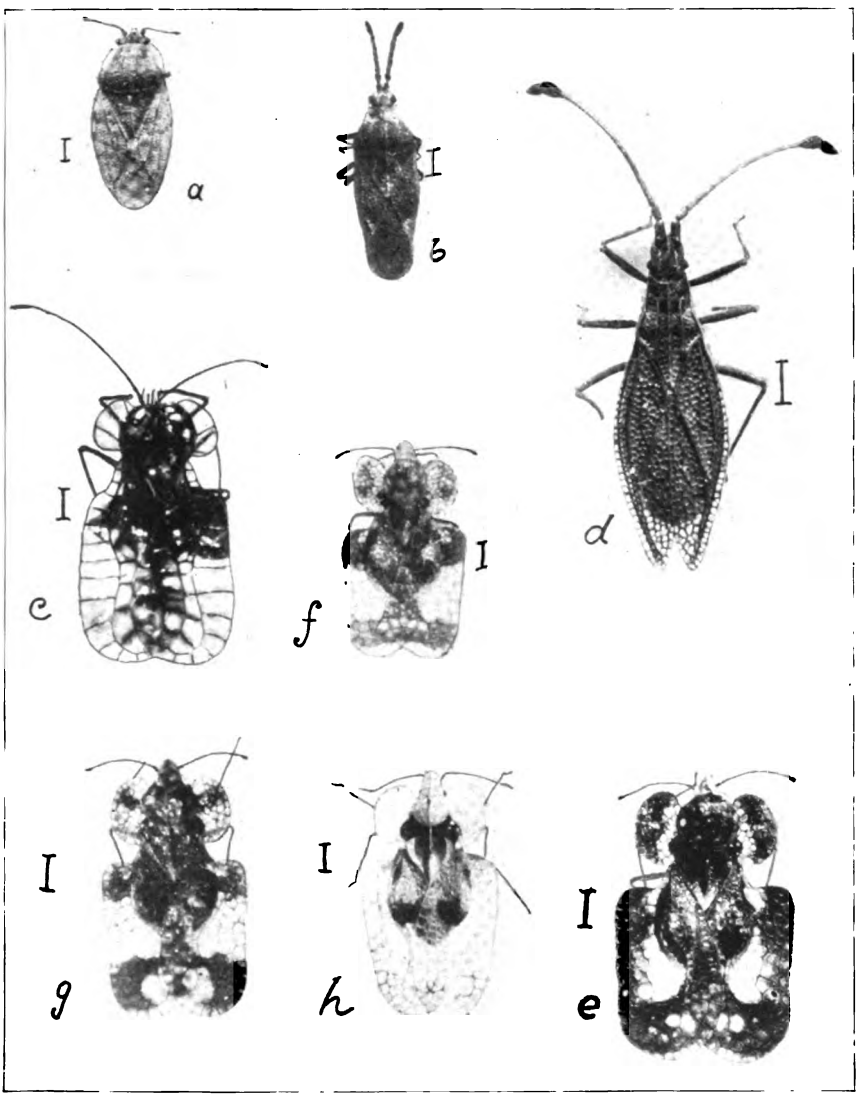

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